EXTENSION NOTE

forest sciences
NELSON FOREST REGION

October 1998 EN-040

CASE STUDY:
Commercial Thinning Older Forests in the Interior Cedar Hemlock Subzone

- **Commercial thinning is operationally feasible on gentle ground in an 85-year-old stand in the ICHwk1.**
- **The engineering and cruising costs were 50% higher for the commercial thinning area than for the group selection portion of the block. The cost to commercial thin was 40% more than the group selection.**

INTRODUCTION

Commercial thinning of older forests (80-100 years) is becoming an increasingly popular approach in constrained areas because it gives forest managers the option to harvest some volume now while allowing the growth rates of the remaining crop trees to improve.

Revelstoke Community Forest Corporation (RCFC) conducted a small operational commercial thinning trial in January 1998. Previous fires in the area had resulted in a dense even-aged stand of 85-year-old spruce and hemlock of merchantable size (Figure 1). The commercial thinning unit is a small (3.1-ha) area of timber that offered a unique opportunity to try commercial thinning.

Harvesting operations in the Revelstoke Forest District have been concentrated in old growth. The timber profile is dominated by old growth (54%). Eight per cent of the profile comprised stands aged 40-85, which are candidate areas for commercial thinning in the future. This technique provides opportunities to have more flexibility in harvest scheduling, and to maintain or improve wildlife habitat, recover mortality, and increase quality of the final crop trees.

The objectives of this commercial thinning trial were to:

- Obtain some merchantable volume from a stand that would normally not provide volume for 20 to 30 years.
- Gain some experience with commercial thinning in a low-risk, small-scale, low-cost operation.
- Increase the value of future crop trees by "releasing" the best crop trees.
- Determine if commercial thinning with a local contractor's equipment profile is feasible.

SITE

The site is located approximately 100 km north of Revelstoke, in the lower Goldstream River valley on Lookout Mountain (Figure 2). The block is in the Interior Cedar Hemlock--wet, cool (ICHwk1) biogeoclimatic subzone. The elevation is approximately 850 m and the terrain is gently rolling. The site is dominated by a rich, podzolic soil with a relatively thin mor humus layer underlain by deep glacial tills.

The commercial thinning unit is an 85-year-old stand surrounded by old growth (150-250 years). The timber type is Se_{85}, Hw_{08} (Cw, Hw vets)$_{07}$ with 950 merchantable stems/ha. The merchantable volume is approximately 260 m^3/ha. The average height is 23 m, and the average diameter is 26 cm. Growth rates are slowing down, and competitive mortality has begun to occur (3480 dead stems/ha).

The area that was commercially thinned is part of a larger (69.8-ha) group selection silviculture system (Figure 3). The overall objective for the entire block is to manage it on an uneven-aged basis. Approximately one third of the area was harvested in small, well-spaced patches ranging from 0.4 to 1.5 ha on a 100-year rotation.

Commercial thinning was carried out concurrently with the harvesting of the first pass units. Final harvest of the commercial thinning unit will occur during the second pass, i.e. in 33 years. There are numerous Cw vets within the commercial thinning unit and these will be retained for wildlife trees where feasible (Figure 4).

PLANNING AND LAYOUT

Two fixed-area cruise plots measured all stems over 12.5 cm diameter (dbh), by diameter

Figure 1. Due to the occurrence of fire 80-100 years ago, regenerated stands of spruce and hemlock are dense.

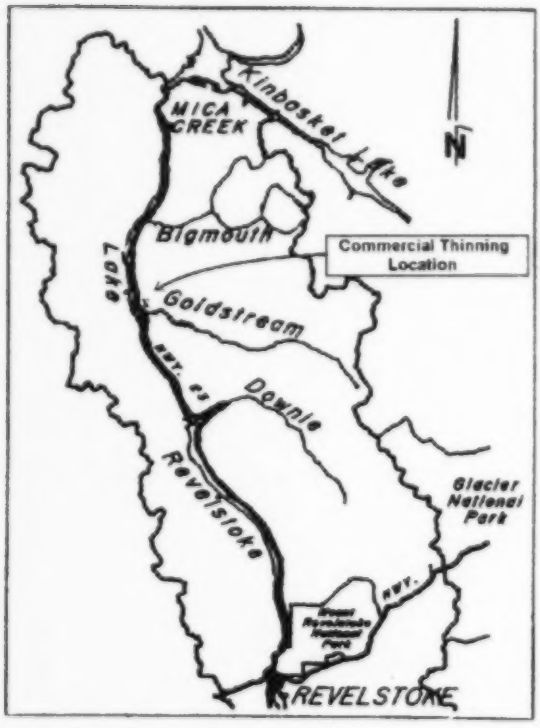

Figure 2. Location of study site.

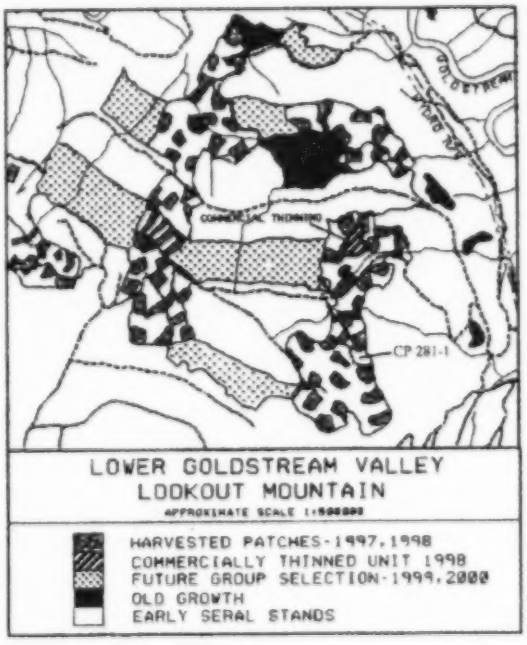

Figure 3. Map of harvesting and commercial thinning activities.

classes. Stems <12.5 cm dbh were not recorded because these were not considered to be competing with the crop trees. The prescription was to harvest a cross section of species and diameter classes. The stand was "marked to cut" and the criteria for crop trees were determined in the field during this process.

HARVESTING

This unit was thinned in four days in January 1998 on a 0.5-m snowpack. Approximately 150 m^3/ha (just over half of the merchantable volume or one third of the merchantable stems) were thinned. A Caterpillar 325 hoe/excavator hoe-chucked the wood to the skid trails, and a 527 Caterpillar skidder with grapple skidded the logs. This equipment, which was used to harvest the old growth in the group selection area, is larger than what is usually used in commercial thinning operations, but the small area did not justify the expense of bringing in other equipment.

The fallers were directed to fall the marked trees, but were allowed flexibility to choose alternative trees if necessary. They expressed some concern about felling trees with small intertwined crowns. In many cases alternates were felled, resulting in some confusion about crop tree criteria.

A total of 621 m of skid trails were designated prior to harvesting, occupying 0.49 ha or 16% of the total commercial thinning area. Spacing of skid trails ranges from 70 to 130 m apart, and the average width is 8 m. In the southeast portion of the block, the faller felt that the trails were built too far apart to directionally fell trees to the trail. Smaller trails built closer together (approximately 25 m apart) are preferred. There was very little soil disturbance on the skid trails, as they were constructed on compacted snow (Figure 5).

POST-HARVEST STAND

Five 100-m^2 circular plots were established throughout the unit to determine post-thinning stand structure. The results indicate the following:

- Number of stumps (trees thinned)
  = 260 stems/ha (Hw_{80}, Sx_8)
- Total live trees, post thinning
  = 1480 stems/ha (Figure 6)
- Total live trees, post thinning (12.5 cm+)
  = 660 stems/ha
- Total well-spaced future crop trees
  = 420 stems/ha (Figure 7)
- Total dead standing stems, post thinning
  = 3480 stems/ha (all <12.5 cm dbh)

During the thinning operations, 260 stems/ha of merchantable stems were removed, leaving approximately 660 stems/ha over 12.5 cm dbh. This exceeded the target of 450 stems/ha plus mortality. At the time of thinning, the emphasis was placed on ensuring that the commercial thinning activities were operationally feasible for the workers.

There are a significant number of advanced regeneration (1800 stems/ha) and standing non-merchantable dead stems (3500 stems/ha). There was some confusion among the fallers as to whether they should fell the small-diameter stems and advanced regeneration. They

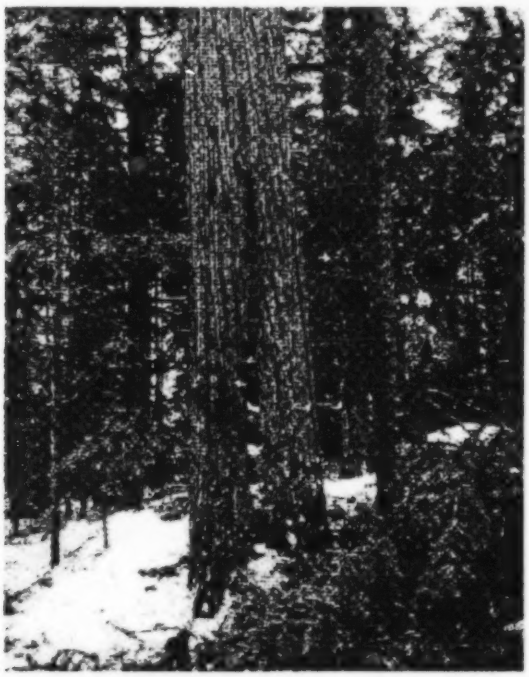

Figure 4. Wildlife trees were retained where feasible.

Figure 5. Skid trails were constructed on compacted snow.

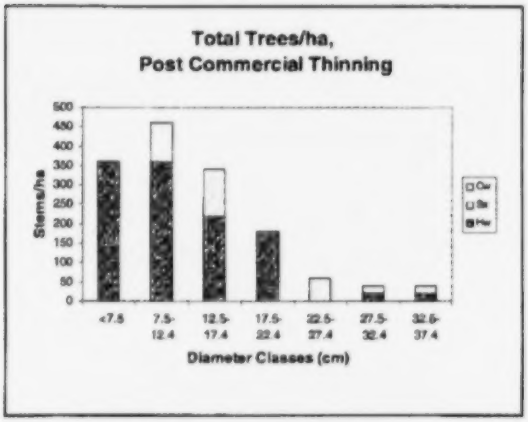

Figure 6. Total live stems, post thinning.

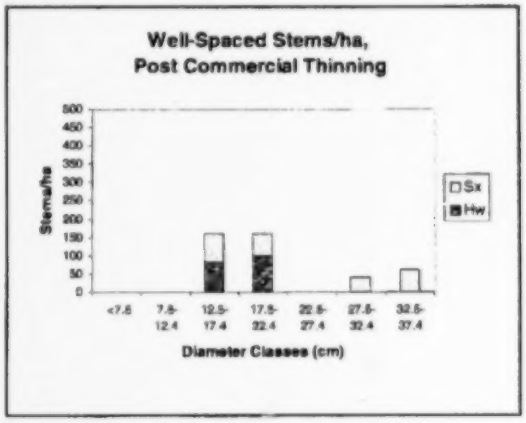

Figure 7. Total well-spaced stems.

were directed not to fall them because these stems were not perceived to be competing with the potential crop trees.

COSTS

The engineering and cruising costs were 50% higher for the commercial thinning area than for the group selection portion of the block. The extra costs included marking the trees. The cost to commercial thin was 40% more than the group selection. These costs included the extra faller, hoe, and skidder time.

SUMMARY

Commercial thinning is operationally feasible on gentle ground in an 85-year-old stand in the ICHwk1. This project was established to gain commercial thinning experience in a low-risk, low-cost situation. RCFC and the forest workers made the following recommendations for future commercial thinning operations in the area:

- Reduce the width of skid trails by using smaller harvesting equipment such as a D4 with arch and cable chokers.
- Skid trails should be approximately two tree lengths apart to facilitate falling directionally to the trails.
- Clearly define crop tree selection criteria at the prescription stage to ensure that the best crop trees are retained.
- "Mark to cut" trees in a small area to demonstrate the thinning criteria. On the remainder of the area, allow the workers to choose the best crop trees and thin the other trees where it is safe and feasible.
- Address the treatment of advanced regeneration in the prescription.
- Address potential forest health concerns, such as *Echinodontium tinctorium*. Establish a monitoring program to determine extent of thinning damage and contingency plans.

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